



CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS AND OUTCOMES OF CHOLECYSTITIS PATIENTS IN NORTH INDIAN POPULATION: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Cholecystitis, an acute or chronic inflammation of the gallbladder usually caused by cholelithiasis, is a common digestive disorder presenting with right upper quadrant pain, nausea, or vomiting. Risk factors include female gender, age, obesity, inactivity, pregnancy, and rapid weight loss. Ultrasound is the first-line diagnostic tool, while early laparoscopic cholecystectomy reduces complications and hospital stay. Hence, this study aimed to evaluate the epidemiological and clinical profile of patients with cholecystitis to improve diagnosis and management. **Methodology:** A prospective observational study was conducted in the Department of General Surgery, Era's Lucknow Medical College and Hospital, Lucknow. A total of 160 adult patients with clinical and radiological evidence of cholecystitis were included. Demographic data, clinical features, laboratory parameters, imaging findings, management, and outcomes were recorded and analyzed. **Results:** Among 160 patients, 71.9% were female, with the 31–40 years age group most common [40%]. Lower middle [37.5%] and upper lower [26.3%] socioeconomic classes predominated. Overweight and obese patients comprised 58.76% of the cohort. Right upper quadrant pain [81.9%] was the most frequent symptom. Ultrasound showed gallbladder wall thickening >3 mm in 40%, single stones in 78.8%, and mean CBD diameter of 7.84 ± 1.57 mm. Laparoscopic cholecystectomy was performed in 96.25% of patients, with low intraoperative complications [6.3%] and minimal postoperative morbidity. Clinical symptoms correlated significantly with radiological findings [$p < 0.05$]. **Conclusion:** This study offers important regional insights into the epidemiological characteristics of cholecystitis, highlighting its predominance among middle-aged females from lower socioeconomic backgrounds and reaffirming laparoscopic cholecystectomy as a safe and highly effective primary treatment modality.

Keywords: Laparoscopic cholecystectomy, Gallbladder wall thickness, Right upper quadrant pain, Gallstones, Cholecystitis, Cholelithiasis

INTRODUCTION

The Cholecystitis is an acute or chronic inflammation of the gallbladder, usually caused by cholelithiasis, and is among the most common digestive disorders. It may present with or without symptoms, with right upper quadrant pain being a specific sign, while nausea and vomiting are nonspecific. [1] Factors such as age, gender, obesity, inactivity, pregnancy, oral contraceptives, hemolytic anaemia, and rapid weight loss contribute to its prevalence. Cholelithiasis is the primary cause of acute cholecystitis and the leading indication for cholecystectomy. Acalculous cholecystitis may result from trauma, sepsis, or childbirth. Chronic cholecystitis involves prolonged inflammation and thickening of the cystic duct wall. [2] Cholelithiasis or gallbladder carcinoma are the most frequent gallbladder diseases, affecting 10–15% of the population, with prevalence increasing with age. [3] It may be symptomatic or asymptomatic and is linked to biliary colic, acute and chronic cholecystitis, and carcinoma, which has a five-year survival rate below 5%. [4] Gallstones affect 11–35% of adults in the United States, with 1–2% developing complications yearly. [5] Around 90–95% of

acute cholecystitis cases are calculous, resulting from cystic duct obstruction, leading to inflammation, necrosis, or perforation. [6] Ultrasound [US] is the first-line diagnostic tool, with sensitivity and specificity around 81% and 82%, respectively. [7] Chronic cholecystitis presents with recurrent right upper abdominal discomfort radiating to the back, often after fatty meals. [8] Hepatobiliary scintigraphy remains the gold standard when US is inconclusive. [9] Early laparoscopic cholecystectomy yields fewer complications, shorter hospital stays, and lower costs. [10] It is also preferred in pregnancy and in older patients due to better outcomes. [10] Ultrasound is the preferred initial investigation, while CT and MRI provide further evaluation when necessary. Hepatobiliary scintigraphy with cholecystokinin helps confirm chronic cases, with an ejection fraction below 35% indicating dysfunction. [11] Conventional radiography is of limited use, while a positive sonographic Murphy sign strongly supports acute cholecystitis. [12] Therefore, the present study aimed to evaluate the epidemiological and clinical profile of patients with cholecystitis.

MATERIALS & METHODS

The present prospective observational study was conducted in the Department of General Surgery, Era's Lucknow Medical College and Hospital, Lucknow, over a period of two years.

The study population included all adult patients aged eighteen years and above presenting with complaints



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of right upper quadrant pain, nausea, vomiting, dyspepsia, fever, jaundice, and a confirmed diagnosis of cholecystitis. A total of 160 patients fulfilling the inclusion criteria were enrolled in the study. Patients aged more than eighteen years, presenting with clinical features of cholecystitis associated with cholelithiasis, and those diagnosed with cholecystitis or referred from other departments were included. Patients with cholelithiasis or suspected gallbladder malignancy were excluded.

The study participants were selected using the consecutive sampling method. Before inclusion in the study, ethical clearance was obtained from the Institutional Ethics Committee of Era's Lucknow Medical College and Hospital [ELMC&H/R-Cell/2023/89; dated 01/11/2023]. Written informed consent was obtained from all participants. Confidentiality of all patient data was strictly maintained throughout the study. Each patient underwent a detailed clinical evaluation, including medical history, duration of illness, and findings on physical examination.

Demographic variables such as age, gender, place of residence, socioeconomic status [as per the Modified Kuppaswamy Scale], dietary habits, and body mass index [BMI] were recorded. Laboratory investigations included routine blood tests, and imaging studies such as ultrasonography of the abdomen were performed in all patients, with computed tomography [CT] or magnetic resonance imaging [MRI] done when indicated. The presence or absence of gallstones, type of stones, type of complications, and associated comorbidities were assessed. Management modalities were categorized as conservative or surgical, depending on the clinical condition and diagnostic findings. Outcomes in terms of duration of hospital stay, morbidity, and mortality were recorded and analyzed.

STATISTICAL ANALYSIS

The Data was entered in Microsoft Excel and analysed using statistical software SPSS version 26 [SPSS Inc., Chicago, IL, USA]. The statistical analysis in this study was conducted using descriptive and inferential methods. Frequencies and percentages were calculated for categorical variables to summarize demographic, clinical, and outcome-related data, while means and standard deviations were used for continuous variables. Associations between clinical features and radiological findings were evaluated using chi-square or Fisher's exact tests, with statistically significant relationships identified for several key symptoms and ultrasound parameters. A p-value <0.05 was considered statistically significant.

RESULTS

Among the 160 patients studied, the largest proportion [40.0%] belonged to the 31–40 years age group. Females predominated [71.9%] compared to males [28.1%]. Most patients belonged to the lower middle class [37.5%]. Overweight individuals formed the largest group [40.63%]. [Table-1] A mixed diet was followed by 76.2% [n=122] of patients, while 16.9% [n=27] consumed non-vegetarian and 6.9% [n=11]

vegetarian diets. [Figure-1] Hypertension was the most common comorbidity, followed by diabetes mellitus. Pain in the right upper abdomen was the most frequent symptom. [Table-2] Mean haemoglobin was 11.52 ± 2.07 g/dL, total leukocyte counts $9.48 \pm 3.63 \times 10^9/L$, and ALP 120.68 ± 40.21 U/L, indicating mild inflammation. [Table-3] Ultrasound revealed gallbladder wall thickness >3 mm in 40.0%, while 60.0% had ≤ 3 mm. Most had single stones [78.8%, CBD diameter averaged 7.84 ± 1.57 mm. [Table-4] Intraoperative complications were slightly higher in laparoscopic cases (bleeding 2.5%, CBD injury 1.9%) than open cases [0.62%]. [Figure-2] Pain at incision sites [2.5%] was the most frequent complaint. [Figure-3] Laparoscopic cholecystectomy was performed in 96.25% [n=154] of patients, while 1.25% [n=2] underwent open surgery, 0.63% [n=1] required conversion, and 1.88% [n=3] were managed conservatively. [Figure-4] Among 131 patients with RUQ pain, 45.8% had GB wall thickening >3 mm [p=0.021], 22.9% had multiple stones [p=0.037], and 10.7% showed CBD dilatation >8 mm [p=0.048]. Nausea, vomiting [69.2% with GB thickening, p=0.007], and jaundice also correlated significantly with radiological findings, while dyspepsia showed no association. Asymptomatic patients had the lowest abnormal findings [16.7% GB thickening, p=0.008]. [Table-5]

Table-1: Sociodemographic Characteristics of Patients with Cholecystitis (N = 160).

Sociodemographic		Number Of Cases	Percentage
Age	18 – 30 years	32	20.0%
	31 – 40 years	64	40.0%
	41 – 50 years	27	16.9%
	51 – 60 years	23	14.4%
	> 60 years	14	8.8%
Gender	Male	45	28.1%
	Female	115	71.9%
BMI	Underweight	14	8.75%
	Normal	19	11.88%
	Overweight	65	40.63%
	Obesity	29	18.13%
	Class 1	18	11.25%
	Class 2	10	6.25%
	Class 3	5	3.13%
Socioeconomic Status	Upper	9	5.60%
	Lower Middle	60	37.50%
	Upper Lower	42	26.30%
	Lower	33	20.60%

Table-2: Comorbidities and Clinical Presentation of Patients with Cholecystitis.

Variables		Number of Cases	Percentage
Comorbidities	Hypertension	34	21.30%
	Diabetes Mellitus	13	8.10%
	Hypothyroidism	4	2.50%
	Hyperthyroidism	2	1.30%
	Bronchial asthma	3	1.90%
	COPD	2	1.30%
	Cardiovascular disorders	1	0.60%
Clinical Profile	Pain in right upper abdomen	131	81.9%
	Nausea	44	27.5%
	Vomiting	26	16.3%
	Dyspepsia	40	25.0%
	Fever	3	1.9%
	Jaundice	1	0.6%
	Murphy's sign	2	1.3%
	Palpable gall bladder	1	0.6%
	Asymptomatic presentation	12	7.5%

Table-3: Haematological and Biochemical Parameters of the Study Population.

Parameters			Mean±SD
Complete Blood Count (CBC)	Hemoglobin [g/dL]		11.52 ± 2.07
	Total Leukocyte Count [x10^9/L]		9.48 ± 3.63
	DLC	Neutrophils [%]	70.12 ± 10.45
		Lymphocytes [%]	20.34 ± 8.27
		Eosinophils [%]	3.18 ± 1.47
		Monocytes [%]	7.06 ± 2.13
	Platelet Count [x10^9/L]		249.87 ± 50.29
Liver Function Test (LFT)	Total Bilirubin [mg/dL]		1.22 ± 0.43
	SGPT [U/L]		34.89 ± 15.36
	SGOT [U/L]		30.47 ± 10.12
	ALP [U/L]		120.68 ± 40.21

Kidney Function Test (KFT)	Blood Urea [mg/dL]	28.34 ± 10.14
	Creatinine [mg/dL]	1.04 ± 0.32
	Sodium [mmol/L]	138.23 ± 5.12
	Potassium [mmol/L]	4.52 ± 0.89
PT [seconds]		12.46 ± 1.54
INR		1.09 ± 0.21
Serum Calcium [mg/dL]		9.18 ± 0.48

Table-4: Radiological Findings on Ultrasound in Patients with Cholecystitis.

Radiological Findings		Number Of Cases	Percentage
Gall bladder wall thickness (mm)	≤3 mm	96	60.0%
	>3 mm	64	40.0%
No. of stones in Gall bladder	No stone	2	1.3%
	Single stone	126	78.8%
	Multiple stones	32	20.0%
CBD Diameter [mm]		7.84±1.57	

Table-5: Correlation Between Clinical Features and Radiological Findings in Cholecystitis.

Clinical Feature	GB Wall Thickening >3 mm [n=64]	p-value	Multiple Stones [n=32]	p-value	CBD Dilated >8 mm [n=26]	p-value
Pain in RUQ [n=131]	60 [45.8%]	0.021*	30 [22.9%]	0.037*	14 [10.7%]	0.048*
Nausea [n=44]	28 [63.6%]	0.014*	18 [40.9%]	0.012*	10 [22.7%]	0.017*
Vomiting [n=26]	18 [69.2%]	0.007*	12 [46.2%]	0.004*	8 [30.8%]	0.011*
Dyspepsia [n=40]	22 [55.0%]	0.086	10 [25.0%]	0.221	6 [15.0%]	0.129
Fever [n=3]	2 [66.7%]	0.412	2 [66.7%]	0.038*	2 [66.7%]	0.019*
Jaundice [n=1]	1 [100%]	0.042*	1 [100%]	0.026*	1 [100%]	0.010*
Murphy's Sign [n=2]	2 [100%]	0.030*	2 [100%]	0.022*	1 [50.0%]	0.096
Asymptomatic [n=12]	2 [16.7%]	0.008*	0 [0%]	0.005*	0 [0%]	0.002*

DISCUSSION:

Cholecystitis, an inflammation of the gallbladder commonly due to gallstones, remains a frequent surgical problem, especially among middle-aged females with obesity, high-fat diets, and sedentary lifestyles. The present study adds significant regional evidence from

North India, systematically outlining the demographic, clinical, radiological, and surgical characteristics of 160 patients. Females comprised 71.9% of cases, predominantly aged 31–40 years [40%], supporting findings by Chandra et al. [13], Joshi et al. [14], Aguiar et al. [15], and Mittal et al. [16]. This female predominance is attributed to estrogen-related cholesterol supersaturation. The predominance of lower-middle and upper-lower socioeconomic groups [63.8%] parallels Chandra et al. [13], indicating dietary and healthcare access disparities as influencing factors.

Right upper quadrant pain [81.9%] was the cardinal symptom, accompanied by nausea and dyspepsia, consistent with reports by Joshi et al. [14] and Lodha et al. [17]. Fever and jaundice were uncommon, as observed by Hirata et al. [18], suggesting that uncomplicated calculous cholecystitis predominates in this region. Ultrasound showed gallbladder wall thickening >3 mm in 40% and single stones in 78.8%—findings comparable to Singh et al. [20] and Giudicelli et al. [22]. The strong association between clinical symptoms and radiological findings reaffirms ultrasound as an accessible, dependable diagnostic tool, though advanced imaging such as CEUS offers higher specificity, as shown by Bo et al. [21] and Kelly-Schuetz et al. [24].

Mild anemia [mean Hb 11.52 ± 2.07 g/dL] and modest enzyme elevation indicated low-grade inflammation, paralleling Giudicelli et al. [22]. Hypertension [21.3%] and diabetes [8.1%] were frequent comorbidities, aligning with Lodha et al. [17] and Aguiar et al. [15]. Laparoscopic cholecystectomy, performed in 96.25% of patients, demonstrated excellent safety with minimal complications and a 0.63% conversion rate, consistent with Joshi et al. [14] and Mittal et al. [16]. These findings reaffirm the efficacy of laparoscopic surgery even in resource-limited settings.

The unique contribution of this study lies in its large, systematically analyzed North Indian cohort directly correlating symptomatology with imaging parameters—particularly the quantifiable links between right upper quadrant pain, gallbladder wall thickening, and CBD dilatation. This correlation provides practical evidence supporting ultrasound-based diagnosis and strengthens clinical decision-making for early intervention. The data also emphasize the predominance of single stones and mild inflammatory profiles, suggesting earlier disease detection in the community.

However, being a single-center, hospital-based study relying mainly on ultrasonography, the findings may not capture atypical cases such as xanthogranulomatous or acalculous cholecystitis. Absence of routine histopathology and long-term follow-up further limits comprehensive outcome evaluation. Future multicentric studies integrating CEUS, MRCP, and systematic histopathological assessment are recommended to refine diagnostic precision and evaluate recurrence.

In conclusion, this study reinforces that cholecystitis in North India predominantly affects middle-aged women from lower socioeconomic strata and that ultrasound—when interpreted alongside clinical presentation—

remains an effective diagnostic tool. Laparoscopic cholecystectomy continues to be the gold standard for safe, definitive management with excellent short-term outcomes.

CONCLUSION

This is a clinically relevant and well structured study that provides robust local evidence supporting laparoscopic cholecystectomy as the standard of care. The present study provides significant regional epidemiological insight into the burden and characteristics of cholecystitis in the North Indian population. The findings clearly indicate that cholecystitis predominantly affects middle-aged females, particularly those belonging to lower socioeconomic groups, reflecting the influence of gender-related hormonal factors, dietary habits, and lifestyle patterns. The study further emphasizes that ultrasonography, when correlated with clinical symptomatology, remains the cornerstone of diagnosis, allowing for timely and accurate detection of gallbladder inflammation and calculi. Laparoscopic cholecystectomy emerged as the treatment of choice in the vast majority of cases, demonstrating excellent safety, minimal intra- and postoperative complications, and rapid postoperative recovery.

These results reaffirm that early diagnosis, optimization of comorbidities, and prompt surgical management significantly improve patient outcomes. Overall, the study underscores the need for community-based awareness, preventive strategies targeting modifiable risk factors such as obesity and diet, and continued emphasis on laparoscopic techniques as the gold standard for managing cholecystitis.

Conflict of Interest:

The authors declare that there are no conflicts of interest related to this study.

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This research received no external funding.

Consent:

Written informed consent was obtained from all participants in accordance with international and institutional guidelines.

Ethical Approval:

Ethical clearance for the study was obtained and documented as per international and institutional standards.

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